FEDERAL COMMUNICATIONS COMMISSION
S0LICITATION NO. SOL03000017

Semi-anechoic Chamber for FCC Laboratory

General:

This solicitation describes a requirement for a turn-key, 3-meter semi-anechoic chamber installation to be located at the Federal Communications Commission Laboratory, 7435 Oakland Mills Road, Columbia, Maryland 21046. Installation of the chamber will require construction of a pre-engineered metal enclosing structure adjoining the existing FCC Laboratory building, to be included as a part of the turn-key contract. The chamber will be utilized by the FCC Laboratory for radiated emissions compliance testing of devices subject to FCC equipment approval, as well as for RF emissions and immunity measurements associated with research projects.

Schedule:

The facility must be completed, cleaned, tested, and ready for FCC use within 16 weeks from date of contract.

Vendor Qualifications:

The prime contractor is required to be a company possessing demonstrated expertise in, and regularly engaged in providing, anechoic test environments for the electromagnetic compatibility (EMC) testing community.

Site:

The facility will be constructed on a site immediately adjoining the east wall of an existing laboratory room (Room 112) of the FCC Laboratory's main building, as shown in the attached site drawing. The site is level, clear, unobstructed and unpaved. The soil has been undisturbed for at least 29 years, and is thought to be of good load-bearing quality. Visits to inspect the site may be arranged by contacting Ms. JoAnn Summers at (202)418-0935, e-mail: Summers@fcc.gov.

Minimum Configuration:

The vendor shall be required to design, furnish to the site, install, and test a turn-key facility, ready for immediate use by the Government, consisting of at least the following major elements:

Shelter structure
RF-shielded enclosure
RF-shielded access door
RF absorbers
Raised floor/ground plane
Turntable
Measurement antenna mast
Controllers and cabling for turntable and mast
Heating, ventilating and air-conditioning (HVAC) system
Lighting
Filtered electrical distribution and wiring
12. Fire suppression system

Overall RF Performance Minimum Requirements:

The facility shall meet or exceed the following requirements:

Normalized Site Attenuation (NSA) requirements of ANSI Standard C63.4 (2000) with a 2 m diameter x 2 m high cylindrical compliant test volume (swept test method)
Field Uniformity requirements of IEC Standard 61000-4-3 over a 1.5 m x 1.5 m area
Shielding Effectiveness requirements of MIL-STD-285.

The vendor shall provide independently verifiable testing of the facility to the above requirements, with a detailed test report to the Government, prior to acceptance.

Minimum Requirements for Each Major Element:

1. Shelter Structure

The shelter structure providing environmental protection to the anechoic chamber shall be, at minimum, a pre-engineered, commercial-grade metal building sharing a common wall with the existing FCC Laboratory building. The foundation and footing construction shall be standard concrete slab-on-grade complying with
prevailing local building codes. Testing of soil to ensure adequate foundation design shall be the responsibility of the Contractor. The structure shall fully comply with all prevailing local building codes for commercial structures, including but not limited to, requirements for seismic, snow and wind loading and thermal insulation.

The shelter shall be sized appropriately, and have appropriate personnel doors to provide adequate access to all chamber penetration points and mechanical systems for ease of maintenance and modification. The shelter shall have an exterior wall color that matches or complements the color of the adjoining existing building.

2. RF-Shielded Enclosure

The RF-shielded enclosure shall provide a minimum clear height, with absorbers installed, of at least 18 feet above the ground plane. It shall have appropriate penetrations for HVAC ducts, wiring and cabling, and any fire suppression plumbing that maintain the specified shielding effectiveness. Appropriate connector panels shall be provided for cable and waveguide connections to equipment inside the chamber to allow flexibility for various test configurations. One unassigned, 1-1/2-inch minimum diameter pipe penetration with cap, located in a non-critical area, shall also be provided.

3. RF-Shielded Access Door

An RF -shielded access door with a clear opening of at least 4’-0” wide by 7’-0” high shall be provided in the wall adjoining Room 112. The door shall maintain the specified shielding effectiveness when closed, and shall be provided with a safety interlock switch to control power to any RF amplifier used in immunity testing. Any ramp necessary to allow equipment cart access to the chamber floor shall be provided. A door maintenance kit containing supplies and instructions necessary to maintain the shielding effectiveness and proper operation of the door shall be provided.

4. RF Absorbers

RF absorbers affixed to the interior surfaces of the shielded enclosure shall provide the specified NSA performance for radiated emissions testing over the frequency range from 30 MHz to 18 GHz. Removable absorbers shall also be provided for floor placement to allow the specified

performance for immunity measurements from 26 MHz to 18 GHz. As general chamber utility above 18 GHz is desired, documentation of the theoretical performance of the absorbers to 40 GHz shall be provided.

5. Raised Floor/Ground Plane

The metallic floor/gound plane of the chamber shall be raised sufficiently above the foundation slab to allow flush mounting of the turntable and to allow easy routing of, and access to, cabling. Access panels shall be provided where appropriate, and designed to maintain electrical continuity of the ground plane. The ground plane shall allow for Government installation of two Line Impedance Stabilization Networks (LISNs) below the ground plane immediately adjacent to the turntable, with appropriate access. Appropriate connector panels shall be provided near the antenna mast location. The entire ground plane shall be covered with a commercial-grade, 1/8"-thick vinyl floor tile.

6. Turntable

A turntable of at least 2 m in diameter, with a distributed load capacity of at least 2,000 pounds shall be furnished and installed. The top surface of the turntable shall be metallic, equipped with a perimeter brush kit to maintain electrical continuity with the ground plane, and shall be installed flush with the ground plane. At least two 120 VAC, 20 A outlets and one 240 VAC, 30 A outlet for DUT power shall be installed in a removable panel in the center of the turntable. The turntable shall be remotely controlled and be capable of continuous rotation in either direction. The DUT outlets shall be wired so as to be switched from the remote control location.

7. Measurement Antenna Mast

A motorized antenna mast, capable of positioning the center of a measurement antenna at any height between 1 m and 4 m above the ground plane in both horizontal and vertical polarization, shall be provided. The mast/positioner shall provide remote control of antenna height, polarization, and boresiting. The mast/positioner shall be substantially constructed of plastic, nylon, fiberglass or similar non-reflective materials. Any substantial metallic components shall be positioned close to the ground screen.

8. Controllers and Cabling for Turntable and Mast

At minimum, the turntable and mast manufacturers' standard remote controllers shall be furnished and installed at a control position located in Rm. 112 adjacent to the chamber. The mast and turntable controllers may be combined in the same unit. All necessary control cabling shall be furnished and installed.

9. Heating, Ventilating, and Air-Conditioning (HVAC) System

A high-efficiency electric heat pump shall be furnished and installed, capable of maintaining temperature throughout the chamber to a tolerance of +/- 2 degrees F. over an outside ambient temperature range of 0 to 100 degrees F. A thermostat shall be installed in the chamber in such a manner that the cabling penetrations do not compromise the shielding effectiveness. The heat pump air handler shall be equipped with auxiliary resistive heating elements.

10. Lighting

Lighting fixtures shall be furnished and installed to provide even illumination sufficient to allow reading of a printed page anywhere within the chamber. The lighting fixtures and lamps shall be of a type that does not produce RF emissions within the usable frequency range of the chamber.

11. Filtered Electrical Distribution and Wiring

All electrical distribution circuits supplying the chamber, including lights, outlets (DUT and convenience) and equipment within it shall be equipped with UL-approved RF power line filters of sufficient current capacity for the relevant load, with filtering applied to both current-carrying conductors. Distribution wiring and fixtures shall be furnished and installed in compliance with the latest edition of the National Electrical Code, utilizing the spare circuit capacity of the existing electrical distribution panels located in the FCC Laboratory's mechanical room (immediately adjacent to Rm. 112). Electrical conduit capacity sufficient to allow the Government to easily pull additional cables in the future to power large DUTs shall be provided between the Laboratory's mechanical room and the area beneath the ground plane. Sufficient 120 VAC convenience outlets to power ancillary and cleaning equipment shall also be installed.

12. Fire Suppression System

If required by local codes for commercial facilities of this nature, a compliant fire suppression system shall be furnished and installed. Appropriate dielectric breaks shall be installed in any plumbing penetrations into the shielded enclosure.

Additive Alternates:

Technical and cost proposals are also sought to add the following elements to the basic requirement for a turn-key semi-anechoic chamber facility:

1. Shielded Control Room

Furnish and install a 120-sq.-ft. shielded control room immediately adjacent to the chamber within the confines of Rm. 112. Lighting, electrical distribution, and suitable shielded tunnel and connector panel to the chamber shielded enclosure shall be included, as well as a shielded personnel door and adequate ventilation facilities.

2. Closed Circuit Television (CCTV) Monitoring System

Furnish and install a CCTV system, hardened to withstand electric fields of 100 V/m, minimally consisting of one color camera, one remotely controlled ceiling camera mount with controller, one 13-in. diagonal (nominal) color video monitor, all interconnecting cabling, appropriate RF filters, and appropriate shielded enclosure penetrations.

Technical Documentation

In general, the technical proposal shall contain adequate descriptions and specifications of all the required elements of the proposed facility to allow the Government to fully evaluate compliance with the minimum requirements contained herein, as well as to fully evaluate quality and proposed features that exceed the minimum requirements. At minimum, this documentation should include:

1. General description of the configuration of the proposed facility, including dimensions and proposed locations of the major components.
2. Description of proposed site preparation, soils testing, and foundation slab design.
3. Description of proposed enclosing structure, including roof and wall panel materials, finishes, and warranties; thermal insulation properties, and structural loading design parameters.
4. Warranted RF performance of the chamber for both emissions and immunity testing, including shielding effectiveness.
5. Technical specifications (including performance specifications, where applicable) of

materials and equipment to be furnished.

6. Description of proposed testing to ensure compliance with overall minimum RF performance requirements contained herein
7. Any exceptions taken by the vendor to the minimum requirements specified herein.

(End of Solicitation)